



PATENT ABSTRACTS OF JAPAN

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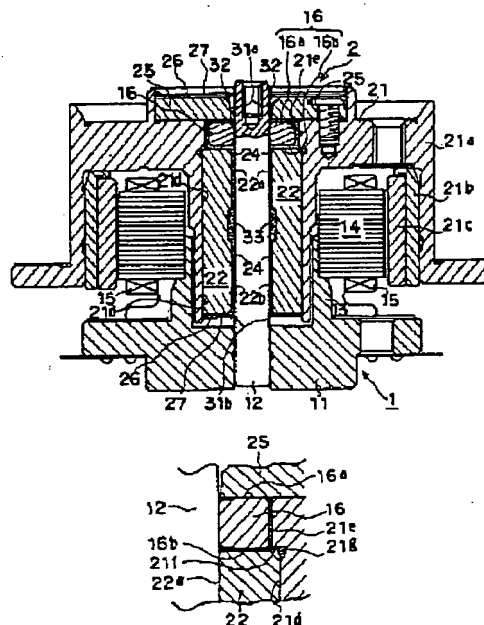
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F16C 17/10**(21) Application number: **09039920**(22) Date of filing: **07.02.97**(71) Applicant: **SANKYO SEIKI MFG CO LTD**(72) Inventor:
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HAYAKAWA MASAMICHI****(54) MOTOR WITH DYNAMIC PRESSURE BEARING****(57) Abstract:**

PROBLEM TO BE SOLVED: To provide longer service life with a simple and low-cost structure by satisfactorily preventing an adhesive from being peeled off.

SOLUTION: As an adhesive for jointing a bearing member 22 to a bearing retainer 21, an elastic adhesive having an elongation larger than a difference in thermal expansion between the bearing member 22 and the bearing retainer 21 is used, and an adhesive pool 21g for permitting the elongation of the elastic adhesive quantitatively is formed. It is thus possible to conduct complete absorption of the above stress by the elongation of the elastic adhesive, even after a shearing force is received by a shift between the bearing member 22 and the bearing retainer 21.

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CLAIMS

[Claim(s)]

[Claim 1] Shaft. Bearing material prepared so that relative rotation might be carried out to this shaft. The bearing supporter joined in one by adhesives to this bearing material. Hydrodynamic bearing equipment with which the aforementioned shaft and bearing material are supported possible [relative rotation] when it **** and the lubricant with which it filled up between the opposite bearing surfaces in the above-mentioned shaft and bearing material is pressurized by the slot for dynamic pressure generating of both the above-mentioned bearing surfaces formed in one side at least. It is the motor equipped with hydrodynamic bearing equipment equipped with the above, and the above-mentioned adhesives are characterized by preparing adhesives ***** which permits the elongation of the above-mentioned elastic adhesives quantitatively in the joint of the aforementioned bearing material and a bearing supporter while they consist of elastic adhesives which have the larger amount of elongation than the differential thermal expansion of the aforementioned bearing material and a bearing supporter.

[Claim 2] The motor equipped with the hydrodynamic bearing equipment with which adhesives according to claim 1 are characterized by filling up the joint of bearing material and a bearing supporter.

[Claim 3] the disk with which the bearing supporter according to claim 1 was joined to the periphery section of bearing material -- from a hub -- becoming -- the above-mentioned disk -- the motor equipped with the hydrodynamic bearing equipment characterized by forming the hub from the aluminum member holding a disk object

[Claim 4] The motor equipped with the hydrodynamic bearing equipment characterized by a bearing supporter according to claim 1 being a bearing electrode holder by the side of the frame holding a stator core.

[Claim 5] The motor equipped with the hydrodynamic bearing equipment with which bearing material and a bearing supporter according to claim 1 are characterized by being joined with the fit dimensional tolerance of eye SHIMARI **.

[Claim 6] The motor equipped with the hydrodynamic bearing equipment with which adhesives ***** according to claim 1 is characterized by being prepared in the part with the smallest thermal relative displacement of the above-mentioned Ryobe material in the joint of bearing material and a bearing supporter.

[Claim 7] While bearing material according to claim 1 consisted of cylinder objects and the bearing supporter has fixed to the periphery side of the bearing object, to the above-mentioned bearing supporter The positioning step against which the axis end side of the aforementioned bearing material was dashed is formed. lubricant The motor equipped with the hydrodynamic bearing equipment characterized by filling up so that it may result [from between the opposite bearing surfaces in a shaft and bearing material] in the positioning step of the above-mentioned bearing supporter at least, and preparing adhesives ***** in the root corner of the positioning step of the above-mentioned bearing supporter.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention makes lubricant generate dynamic pressure, and relates to the motor equipped with the hydrodynamic bearing equipment which supports a shaft and bearing material possible [relative rotation] with the dynamic pressure.

[0002]

[Description of the Prior Art] In recent years, in the motor especially corresponding to high-speed rotation, the hydrodynamic bearing equipment using the dynamic pressure of lubricant, such as oil, is examined variously, and is proposed. The dynamic pressure bearing surface by the side of the shaft by which opposite arrangement was carried out in this hydrodynamic bearing equipment at the shape of a periphery, The slot for dynamic pressure generating is formed in one side for inside [the dynamic pressure bearing surface by the side of bearing material] at least. lubricant, such as predetermined oil which intervened between both the opposite dynamic pressure bearing surfaces of the above-mentioned shaft and bearing material, -- both -- a pressure up is carried out by pumping operation of the slot for dynamic pressure generating at the time of relative rotation of a member -- having -- the dynamic pressure of the lubricant concerned -- rotation -- rotation support of a member is performed

[0003] the bearing material of the motor equipped with such hydrodynamic bearing equipment on the other hand -- receiving -- a disk -- bearing supporters, such as a hub, fix and it is used While this bearing supporter is attached to bearing material by the fit tolerance of eye skimmer ** usually have a latus crevice comparatively, into the fit crevice between this shaft and bearing material, the heat-hardened type adhesives which consist of an epoxy resin etc. are filled up with sufficient amount, and both the above-mentioned members are joined by this in one.

[0004]

[Problem(s) to be Solved by the Invention] However, by change of the various heating processes in a manufacturing process, or service-temperature environment motor in use etc., the adhesives joined to the conventional bearing material mentioned above and a bearing supporter produce thermal stress, and may start an ablation phenomenon from a junction interface. And a minute crevice will be formed in the ablation portion of the adhesives, the lubricant in bearing oozes out outside according to the vas-capillare force of the minute crevice concerned, oil leakage and oil scattering are invited, and a bird clapper is one of the causes of contamination in equipment.

[0005] Especially the problem of such adhesives ablation becomes remarkable when bearing material and a bearing supporter are formed by mutually different material (quality of the material). namely, the above -- both -- the components of a member are made to differ mutually -- both -- the case where the coefficient of linear expansion of a member is different -- both -- the thermal environment of a member changes -- both -- a gap will arise in the joint of a member, shearing force will work in adhesives by gap of shaft orientations especially, and it becomes easy to cause the ablation phenomenon of adhesives which were mentioned above with the shearing force

[0006] Then, this invention is structure [that it is simple and low cost], and it aims at offering the motor equipped with the hydrodynamic bearing equipment which enabled it to attain reinforcement, preventing the ablation phenomenon of the joined adhesives of bearing material and a bearing supporter good.

[0007]

[Means for Solving the Problem] In order to attain such a purpose, by the motor equipped with the hydrodynamic bearing equipment concerning this invention A shaft, the bearing material prepared so that relative rotation might be carried out to this shaft, and the bearing supporter joined in one by adhesives to this bearing material, When it **** and the lubricant with which it filled up between the opposite bearing surfaces in the above-mentioned shaft and bearing material is pressurized by the slot for dynamic pressure generating of both the above-mentioned bearing surfaces formed in one side at least In the motor equipped with the hydrodynamic bearing equipment with which the aforementioned shaft and bearing material are supported possible [relative rotation] the above-mentioned adhesives While consisting of elastic adhesives which have the larger amount of elongation than the differential thermal expansion of the aforementioned bearing material and a bearing supporter, adhesives ***** which permits the elongation of the above-mentioned elastic adhesives is prepared in the joint of the aforementioned bearing material and a bearing supporter.

[0008] And according to the motor equipped with such hydrodynamic bearing equipment, even if it is the case where the adhesives which join bearing material and a bearing supporter receive the stress under thermal influence, and the shearing force by the gap between bearing material and a bearing supporter especially, absorption of the above-mentioned stress is performed by the elongation by the elasticity which adhesives have. Since amount with the above-mentioned adhesives sufficient in adhesives **** is secured at this time, stress, such as shearing which the amount of elongation of adhesives will also fully be secured, therefore was produced by the gap between bearing material and a bearing supporter etc., will be completely absorbed by the elasticity of adhesives, and the ablation phenomenon of adhesives like before is prevented good.

[0009]

[Embodiments of the Invention] Hereafter, a drawing explains this invention in detail about the operation gestalt applied to the so-called HDD spindle motor of an ends shaft cover half. First, explanation of the whole HDD spindle motor structure shown in drawing 1 constitutes this HDD spindle motor from a stator group 1 as a holddown member, and a Rota group 2 as a rotation member attached from the illustration bottom to this stator group 1. Among these, while the stator group 1 has the frame 11 by which a screw stop is carried out to the fixed pedestal side which carried out the illustration ellipsis, the fixed shaft 12 set up by the amount of [of this frame 11] abbreviation center section is prolonged toward the illustration upper part. The screw stop of the point (illustration upper-limit section) of this fixed shaft 12 is carried out to the fixed pedestal which omitted illustration.

[0010] The above-mentioned frame 11 has the hollow cylinder-like support electrode holder 13, and the stator core 14 is attached in the periphery of this support electrode holder 13. The coil 15 is wound around the salient pole section of this stator core 14.

[0011] the disk as a bearing supporter for on the other hand the aforementioned Rota group 2 supporting the predetermined record medium which omitted illustration -- a hub 21 -- having -- **** -- this disk -- a hub 21 -- the disk concerned -- the radial bearing of the shape of an abbreviation hollow cylinder with which a part for the core of a hub 21 was equipped -- it is supported free [rotation] through the member 22 at the periphery side of the above-mentioned fixed shaft 12

[0012] the above-mentioned disk -- while the hub 21 has cylindrical shape-like drum section 21a which equips the periphery section with magnetic-recording media, such as a magnetic disk, the inner circumference side of this drum section 21a is annularly equipped with drive magnet 21c through back yoke 21b Contiguity arrangement of this drive magnet 21c is carried out so that it may counter annularly to the periphery end face of the stator core 14 mentioned above.

[0013] moreover, the above-mentioned disk -- a hub 21 -- from an aluminum containing alloy member -- becoming -- the disk concerned -- the radial bearing which consists of stainless steel material in 21d of wearing holes formed in a part for the core of a hub 21 -- the periphery section of a member 22 is attached by the fit tolerance of eye SHIMARI ** Thus, especially positioning of the direction of a path is performed by equipping with the above-mentioned Ryobe material 21 and 22 by the fit tolerance of eye SHIMARI **.

[0014] furthermore -- especially, it is shown in drawing 2 -- as -- the above-mentioned disk -- positioning step 21e which carried out the specified quantity protrusion of the inner circle wall

toward the center side is formed in the illustration upper-limit portion of wearing holes in a hub 21 21f of illustration bottom end faces in this positioning step 21e is formed in a predetermined precision so that perpendicular ***** may be constituted to shaft orientations, and the illustration upper-limit side of the radial bearing material 22 mentioned above is dashed to 21f of illustration bottom ***** of the positioning step 21e concerned. Predetermined squareness is obtained by this, the above-mentioned radial bearing material 22 being positioned by shaft orientations.

[0015] 21g of adhesives ***** is prepared in the root corner of 21f of ***** in the above-mentioned positioning step 21e further again. the inside of 21g of this adhesives ***** -- the above-mentioned radial bearing -- a member 22 and a disk -- the adhesives for pasting up a hub 21 are filled up -- having -- ***** -- these adhesives -- radial bearing -- the periphery side plane of composition of a member 22, and a disk -- the inner circumference side plane of composition of a hub 21 is joined in one thus, preparing 21g of adhesives ***** in the root corner of 21f of ***** in positioning step 21e -- the part concerned -- radial bearing -- a member 22 and a disk -- it is because it is a part with the smallest amount of thermal relative displacements among joints with a hub 21, and the reliability of junction is raised by this by making deformation of the above-mentioned adhesives into the minimum

[0016] the above-mentioned adhesives consist of predetermined elastic adhesives -- having -- ***** -- radial bearing -- a member 22 and the disk as a bearing supporter -- it has the larger amount of elongation than a differential thermal expansion with a hub 21 it mentioned above -- as -- radial bearing -- the member 22 is formed from stainless steel material -- receiving -- a disk -- a hub 21 is formed from aluminum containing alloy material -- having -- ***** -- these -- both -- although the comparatively big differential thermal expansion is produced between members -- these -- both -- between members -- being concerned -- both -- it fills up with the elastic adhesives which have still bigger elongation than the differential thermal expansion of a member And the elongation of these elastic adhesives is constituted so that it may approve with the amount stored in 21g of adhesives ***** mentioned above.

[0017] As elastic adhesives in this operation form, the ultraviolet-rays hardening type and anaerobic hardening type thing is adopted, and what is hardened at a room temperature is used by using a primer (hardening accelerator) together. Moreover, while viscosity is set below to 1000cp(s) (at 25 degree C), as for the elastic adhesives in this operation form, the thing of the 150% of the amounts of elongation is adopted.

[0018] it is shown in drawing 1 -- as -- the above-mentioned radial bearing -- the member 22 has the dynamic pressure bearings 22a and 22b of the couple by which isolated to shaft orientations (the illustration vertical direction) between predetermined, and the parallel arrangement was carried out to them Opposite arrangement is carried out through the several micrometers crevice to the periphery side of the aforementioned fixed shaft 12, and among both the opposite sides of each [these] radial dynamic pressure bearings 22a and 22b and the fixed shaft 12, the inner skin of the radial dynamic pressure bearings 22a and 22b of these couples is cut in one side at least so that the slot for radial dynamic pressure generating of for example, a herringbone configuration may stand in a row annularly. moreover, between both the above-mentioned opposite sides, the predetermined lubricant 24 which consists of oil, a magnetic fluid, etc. intervenes -- having -- ***** -- the aforementioned disk -- the dynamic pressure which the pressure up of the lubricant 24 was carried out, and dynamic pressure produced, and was produced by the pumping operation of the slot for radial dynamic pressure generating to this lubricant 24 at the time of rotation of a hub 21 -- a disk -- in the direction of a radial, the hub 21 is constituted so that axial support may be carried out

[0019] although the thing of the quality of the material which added heat treatment to stainless steel is adopted as the above-mentioned fixed shaft 12 -- the nose-of-cam side (illustration upper-limit side) of the fixed shaft 12 concerned -- on the way -- into the portion, the thrust board (stop escaping ring) 16 of the shape of a ring which constitutes two thrust dynamic pressure bearings 16a and 16b has fixed Two thrust dynamic pressure bearings 16a and 16b constituted with this thrust board 16 are arranged so that the illustration bottom of the radial dynamic pressure bearing material 22 arranged at the illustration bottom may be adjoined.

[0020] Namely, the illustration undersurface side of the above-mentioned thrust board 16 While being arranged so that the illustration upper-limit side of the radial dynamic pressure bearing

material 22 may be met, the illustration upper-limit side of the thrust board 16. It is arranged so that the illustration soffit side of the thrust pressure plate 25 by which the stop was carried out to a part for the center section of a hub 21 may be met. the aforementioned disk -- The slot for thrust dynamic pressure generating of for example, a herringbone configuration is formed in the shaft-orientations ends side of the thrust board 16 which constitutes the thrust dynamic pressure bearings 16a and 16b concerned annular, respectively.

[0021] moreover, into each crevice portion between the opposite sides of the above-mentioned thrust board 16 and the radial dynamic pressure bearing material 22, and between the thrust board 16, the thrust pressure plate 25, and opposite sides As the lubricant 24 in the radial dynamic pressure bearings 22a and 22b mentioned above continues, it fills up with it. the above-mentioned disk -- the dynamic pressure which the pressure up of the lubricant 24 was carried out; and dynamic pressure produced, and was produced by the pumping operation of the slot for thrust dynamic pressure generating to this lubricant 24 at the time of rotation of a hub 21 -- a disk -- it is constituted so that axial support of the hub 21 may be carried out in the thrust direction

[0022] namely, the disk mentioned above -- from 21g of adhesives ***** prepared in positioning step 21e of a hub 21, thrust dynamic pressure bearing 16b is arranged at the portion by the side of inner circumference, and lubricant 24 is filled there in addition, the above-mentioned thrust pressure plate 25 and a disk -- the joint with a hub 21 is joined so that it may become full sealing structure with adhesives before pouring of lubricant 24, and the sealing nature to lubricant 24 is secured by this good The capillary tube force of the annular guide rail (illustration abbreviation) formed in the joint concerned is filled up with the adhesives with which this joint is filled up continuously without a break over a joint perimeter, and sealing structure is completeness-ized by this.

[0023] Moreover, the sheet metal-like stopper board 27 is formed in the illustration upper-limit side of the above-mentioned thrust pressure plate 25, and the illustration soffit side of the thrust hydrodynamic bearing 22 through the absorption cloth 26 from the outside (an illustration top and under), and even when the worst, external scattering of lubricant 24 is prevented by these absorption cloth 26 and the stopper board 27.

[0024] Furthermore, two radial dynamic pressure bearings 22a and 22b mentioned above and two thrust dynamic pressure bearings 16a and 16b To a part for the shaft-orientations both ends of the bearing space which is installed so that a series of bearing space prolonged in shaft orientations may be formed, and contains these four dynamic pressure bearings 16a, 16b, 22a, and 22b The two capillary tube seal sections 31a and 31b which come it narrow to carry out the crevice between the aforementioned fixed shaft 12 and the members 22b and 25 by the side of rotation are formed so that the four aforementioned dynamic pressure bearings 16a, 16b, 22a, and 22b may be pinched from shaft-orientations both sides.

[0025] Capillary tube seal section 31b of the illustration bottom among each of these capillary tube seal sections 31a and 31b It is prepared in a part of radial dynamic pressure bearing 22b arranged at the illustration bottom. more specifically It is formed so that the narrow crevice between the inner circle wall of the shaft-orientations outer edge portion (illustration soffit portion) of the radial dynamic pressure bearing 22b concerned and the periphery side of the aforementioned fixed shaft 12 may be expanded gradually and may carry out opening toward the method of the outside of shaft orientations of the illustration bottom. Moreover, capillary tube seal section 31a of an illustration top is formed of the narrow crevice between the thrust pressure plates 25 and the fixed shafts 12 which constitute thrust dynamic pressure bearing 16a, and it is formed so that the narrow crevice between the inner circle walls of the thrust pressure plate 25 and the periphery sides of the fixed shaft 12 which were mentioned above may be expanded gradually and may carry out opening toward the method of the outside of shaft orientations of an illustration top.

[0026] As shaft orientations are followed to the vas-capillare seal section 31a concerned, the lubricant pouring section 32 is formed in the shaft-orientations outside (on illustration) of vas-capillare seal section 31a of an illustration top mentioned above further again. This lubricant pouring section 32 consists of an expansion crevice which follows the narrow crevice which constitutes vas-capillare seal section 31a, and the inner circle wall of the thrust pressure plate 25 which has met the aforementioned fixed shaft 12 side is formed by making vas-capillare seal section 31a incline with an open angle also with the constituted still larger inclination corkscrew twist. The crevice inner

capacity of this lubricant pouring section 32 is set up more greatly than inner capacity of bearing space which connects between two vas-capillare seal sections 31a mentioned above and 31b, the whole quantity of lubricant 24 is once poured in by the vacua into the lubricant pouring section 32 by this, and the interior side of bearing space (under illustration) is made to fill up henceforth according to the vas-capillare force.

[0027] In addition, if it hits pouring in lubricant 24, after equipping with sealants, such as an O ring, removable to the vas-capillare seal section 31b side and pouring in lubricant from the lubricant pouring section 32 by the vacua, you can carry out air opening and can also make it filled up with lubricant in bearing space with atmospheric pressure.

[0028] Lubricant ***** 33 which, on the other hand, comes to expand the crevice between the fixed shafts 12 to the portion between shaft orientations of radial dynamic pressure bearing 22a mentioned above and 22b by hollowing the inner skin of the radial dynamic pressure bearing material 22 in a periphery side is formed.

[0029] according to the motor concerning such operation gestalt equipment -- the radial dynamic pressure bearing material 22 and the disk as a bearing supporter -- the stress according [the adhesives which join a hub 21] to thermal influence -- especially -- the radial dynamic pressure bearing material 22 and a disk -- even if it is the case where the shearing force by the gap between hubs 21 is received, absorption of the above-mentioned stress is performed by the elongation by the elasticity which adhesives have

[0030] And since amount with the elastic adhesives sufficient in 21g of adhesives **** at this time is secured, the amount of elongation of adhesives is also fully secured -- ***** -- therefore, the disk as the radial dynamic pressure bearing material 22 and bearing material -- stress, such as shearing produced by the gap between hubs 21 etc. It is completely absorbed by the elasticity of elastic adhesives and the exfoliation phenomenon of adhesives like before is prevented good with it.

[0031] Next, the operation gestalt which applied this invention to the axial rotation type HDD spindle motor is explained. In the operation gestalt of an axial rotation type HDD spindle motor shown in drawing 3, the radial bearing material 42 is being fixed to the inner circumference section of the bearing electrode holder 43 of the shape of an abbreviation hollow cylinder set up by the amount of [of the motor frame 41 as a holddown member] abbreviation center section, and the inner circumference section of this radial bearing material 42 is equipped with the axis of rotation 52 possible [rotation] through the lubricant which omitted illustration.

[0032] Although the above-mentioned bearing electrode holder 43 constitutes a bearing supporter, while being formed from the aluminum containing alloy member and holding the stator core 44 at the periphery section of the bearing electrode holder 43, the periphery section of the radial bearing material 42 which consists of stainless steel material is attached by the fit tolerance of eye SHIMARI ** in 43d of wearing holes formed in a part for the core of the bearing electrode holder 43 concerned. Thus, positioning of the direction of a path is performed by equipping with the Ryobe material 42 and 43 by eye SHIMARI **.

[0033] Moreover, positioning step 43e which comes to project an inner circle wall to a center side a little is formed in the illustration soffit portion of 43d of wearing holes in the above-mentioned bearing electrode holder 43. The illustration top end face in this positioning step 43e is formed in a predetermined precision so that 43f of perpendicular ***** may be constituted to shaft orientations, and the illustration soffit side of the radial bearing material 42 mentioned above is dashed to the 43f of the ***** concerned. As for the radial bearing material 42, predetermined squareness is obtained by it while positioning of shaft orientations is performed by this.

[0034] Furthermore, 43g of adhesives ***** is prepared in the root corner of 43f of ***** established in positioning step 43e of the above-mentioned bearing electrode holder 43 like the operation gestalt mentioned above. the inside of 43g of this adhesives ***** -- the above-mentioned radial bearing -- the elastic adhesives for pasting up a member 42 and the bearing electrode holder 43 are filled up -- having -- **** -- these elastic adhesives -- radial bearing -- the periphery side plane of composition of a member 42 and the inner circumference side plane of composition of the bearing electrode holder 43 are joined in one the elastic adhesives in this case -- the above-mentioned radial bearing -- it has the larger amount of elongation than the differential thermal expansion of a member 42 and the bearing electrode holder 43 as a bearing supporter, and

the elongation of these elastic adhesives is quantitatively permitted by the 43g of the aforementioned adhesives *****

[0035] Moreover, in this operation gestalt, two adhesives ***** 43h and 43j which hollowed the inner circumference side-attachment-wall side of the bearing electrode holder 42 in the periphery side to everything but the 43g of the above-mentioned adhesives ***** are formed in the joint of the bearing electrode holder 42 and the radial bearing material 43.

[0036] the disk in this operation gestalt -- the hub 51 has fixed into the illustration upper-limit portion of the above-mentioned axis of rotation 52 Moreover, while the thrust board (stop escaping ring) 56 has fixed into the illustration soffit portion of the above-mentioned axis of rotation 52, the illustration soffit of the axis of rotation 52 has received possible [rotation] with the thrust-pad board 55, and the above-mentioned axis of rotation 52 is supported by shaft orientations by the thrust bearing section constituted by these each part material. Also in such an operation gestalt, the same operation and effect as the operation gestalt mentioned above can be acquired.

[0037] Furthermore, with the operation form shown in drawing 4, a positioning step like the operation form mentioned above also to any of the above-mentioned Ryobe material 61 and 62 is not prepared in joining the bearing material 61 and both the members of the bearing supporter 62. And adhesives ***** 63 in this case is arranged at a part for the shaft-orientations center section of the bearing supporter 62. By arranging adhesives ***** 63 at a part for the center section of the shaft orientations the thermal relative displacement of the above-mentioned bearing material 61 and the bearing supporter 62 is because it is generated focusing on a part for the center section of shaft orientations, and is [shaft orientations] the center of the thermal relative displacement, this can make deformation of elastic adhesives the smallest and can raise the reliability of junction.

[0038] As mentioned above, although the operation gestalt of invention made by this invention person was explained concretely, it cannot be variously overemphasized by this invention in the range which is not limited to the above-mentioned operation gestalt and does not deviate from the summary that it can deform.

[0039] For example, in each above-mentioned operation gestalt, although made by the composition of maintaining positioning of the direction of a path strictly by fixing bearing material and a bearing supporter by eye SHIMARI **, it is not necessary to necessarily consider both members as eye SHIMARI **, and is good also as skimmer **. However, the fit tolerance in this case requires that positioning of the above-mentioned Ryobe material should consider as the grade which does not cause trouble by the thickness of the adhesives with which it fills up in a crevice.

[0040] Moreover, this invention is applicable similarly to various motors other than the HDD motor mentioned above.

[0041]

[Effect of the Invention] While adopting the elastic adhesives which have the larger amount of elongation as adhesives to which this invention joins bearing material and a bearing supporter like described above than the differential thermal expansion of bearing material and a bearing supporter By preparing adhesives **** which permits the elongation of these elastic adhesives quantitatively Since it is made to absorb the above-mentioned stress by the elongation of elastic adhesives completely even if it is the case where the stress under thermal influence and the shearing force by the gap between bearing material and a bearing supporter are received especially, with structure [that it is simple and low cost] The ablation phenomenon of adhesives like before can be prevented good, reinforcement can be attained, and the reliability of the motor equipped with hydrodynamic bearing equipment can be raised.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is cross-section explanatory drawing showing an example of the HDD spindle motor of the axial cover half equipped with the hydrodynamic bearing equipment concerning 1 operation gestalt of this invention.

[Drawing 2] It is a partial expansion cross-sectional view showing the boundary portion of the radial bearing section and the thrust bearing section in drawing 1.

[Drawing 3] It is half-cross-section explanatory drawing showing the half of the axial rotation type HDD spindle motor equipped with the hydrodynamic bearing equipment concerning other operation gestalten of this invention.

[Drawing 4] It is partial cross-section explanatory drawing which expanded and expressed some hydrodynamic bearing equipments concerning the operation gestalt of further others of this invention.

[Description of Notations]

12 Fixed Shaft

16 Thrust Board

21 Disk -- Hub (Bearing Supporter)

21e Positioning step

21f *****

21g Adhesives *****

22 Radial Bearing Material

24 Lubricant

25 Thrust Pressure Plate

42 Radial Bearing Material

43 Bearing Electrode Holder

43e Positioning step

43f *****

43g Adhesives *****

51 Disk -- Hub (Bearing Supporter)

52 Axis of Rotation

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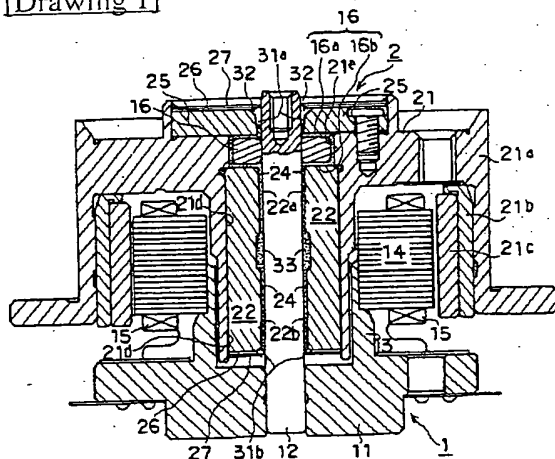
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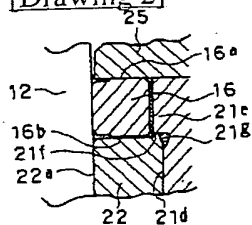
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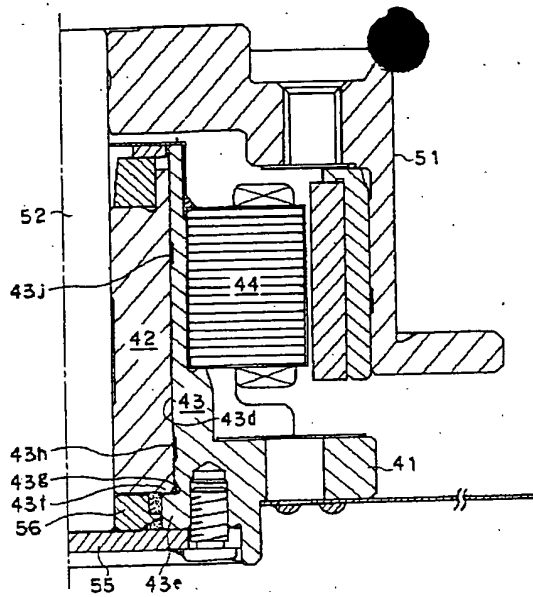
DRAWINGS

[Drawing 1]



[Drawing 2]





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